

Remarks

In the final Office action, claims 1-3, and 7-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,936,811 to Baker ("Baker") in view of U.S. Patent No. 6,672,596 to Devers ("Devers"). Claim 6 was deemed to be allowable if rewritten in independent form.

In this response, claims 1 and 8 were amended, claim 7 was cancelled and new claims 13-20 were added. Upon entry of the amendments claims 1-3, 6, and 8-20 will be pending. Reconsideration and withdrawal of the rejections is requested in view of the following remarks.

Amendments to the Specification:

Applicants have amended paragraph [0028] of the specification to replace the term "bending joints" with the term "flexure joints" so as to more clearly describe the element 10 of Figure 6. In the priority German applications, which were incorporated by reference into the present application, the term "Biegeelenk" was used to describe the element 10 of Figure 6. That term is more properly translated as "flexure element" in the context in which it appears, since the element is provided so as to enable the ring sections 9 to be elastically deformable in a circumferential direction, as opposed to enable bending (in the sense of folding) between the ring sections 9. The context in which element 10 is described in the application as filed similarly makes it clear that the term "flexure element" is a more appropriate description than "bending element" for element 10. No new matter has been added.

New Claims 13-19:

Applicants have added new claims 13-19. Independent claim 13 recites an axle boot for joint sealing, that includes, among other features, a plurality of compensating pieces disposed adjacent an outer surface of the connecting collar so as to form a cylindrical outer circumferential surface, and "a circumferential clamp disposed adjacent an outer surface of the connecting pieces, wherein the connecting pieces are connected to the clamp as an integrated multi-component unit."

Applicants respectfully submit that this feature is not taught or suggested by either of the references. Specifically, Baker teaches that the segmented band segments may be spot welded to the sleeve 15, but does teach the band segments as being connected in any way with the clamp

23 to form an integrated unit. See, e.g. Baker at column 4, lines 34-37. Devers also does not suggest disposing a clamp adjacent to an outer surface of the connecting pieces, and actually teaches against this feature by teaching that the bellows seal 38 is disposed between the clamp ring 48 and the annular body 41. See, e.g. Devers, at column 3, line 63 to column 4, line 9, and Figs. 1 and 2.

A. Rejections under 35 U.S.C. § 103:

Claims 1-3 and 7-12 were rejected under 35 U.S.C. §103(a) as being unpatentable over Baker in view of Devers.

Independent claim 1 has been amended and now recites the additional feature of “a clamp surrounding and contacting the single piece element,” in addition to the feature that the compensating pieces are connected to one another by a plurality of ring sections to form a single piece component “wherein at least one of the ring sections is elastically deformable sufficient to enable the single piece component to expand to a circumference larger than the outer circumference of the connecting collar.” Claim 7 has been cancelled and claim 8 has been amended to change its dependency to claim 1.

Baker describes a boot assembly for a CV joint that includes three separate longitudinal band sections 30 that are secured into position on the outside surface of sleeve 15 of boot 12 by a low-profile clamp 23. Each of the band sections 30 have a tongue 34 at one end and a groove 36 at an opposite end and is designed to intermesh with the other band sections 30 to form a band 22.

Devers describes a seal adaptor assembly 40 that includes an annular body 41 having an inner surface 42 that conforms to the outer surface 36 of a universal joint housing 12. A plurality of inserts 44, made of a more rigid material than the annular body, fit into specially designed pockets 43 formed by wall segments 42a-f.

1. The combination of Baker and Devers does not teach or suggest all of the features of independent claim 1:

Applicants respectfully submit that the combination of Baker and Devers does not teach or suggest at least the feature of “a clamp surrounding and contacting the single piece element” as recited in amended independent claim 1.

Applicants disagree with the Examiner that Baker teaches connecting the compensating pieces connected to one another by a plurality of ring sections to form a single piece component. The Baker band segments 30 are described and shown in the Baker drawings as separate components. The separate segments merely overlap with one another in that the tongue 24 of one segment 30 is inserted to the groove 36 of another segment 30. However, they are not “connected to one another by a plurality of ring sections.” In fact, their very separateness is what allows the band 22 to be able to expand circumferentially as necessary. Column 4, lines 37-41. Thus, the segments 30 do not form “a single piece component” as recited in claim 1, and do not suggest the feature of a clamp surrounding and contacting the single-piece component.

Furthermore, Devers also does not suggest that feature. On the contrary, Devers specifically teaches clamping the bellows (boot seal 38) directly and disposing the compensating pieces (seal adapter 40) between the boot seal 38 and the housing 12. Thus Devers teaches disposing a seal boot 38 between clamp 48 and seal adapter 40, preventing any contact between the clamp and the seal adapter for the express purpose of providing “nearly uniform compression between the clamped seal boot and a universal joint housing member.” Column 2, lines 1-6. Furthermore, the uniformity of compression specifically refers to sealing and clamping forces “between the seal adaptor assembly and the boot seal *and* between the seal adaptor and the housing.” Column 1, lines 47 to 52.

There is thus no suggestion in either Baker or Devers for the feature of a clamp contacting the single-piece component as recited in claim 1.

2. There would have been no motivation to combine features from Baker and Devers:

In addition, Applicants respectfully submit that there would have been no motivation to selectively combine the features of Baker and Devers to arrive at the claimed invention, and that the Examiner is improperly selecting features that otherwise would not fit together from the prior art using hindsight; being guided solely by the Applicants’ claims. Furthermore, Applicants submit that the combination of features selected from Baker and Devers, if combined, would result in a non-workable device.

As already noted, Baker describes separate band segments 30, each having a tongue 24 on one end and a groove 36 on the opposite end. The band segments overlap one another, but are

not connected, in that the tongue 24 of each segment 30 is inserted into the corresponding groove 36 of the adjacent segment 30. The segments 30 are not “connected to one another by a plurality of ring sections to form a single piece component” as recited in claim 1. Nor does Baker suggest at least one ring section being elastically deformable, as admitted by the Examiner. On the contrary, Baker specifically teaches band sections 30 having a rigid tongue configuration 34 on one end and a rigid groove configuration 36 on the other end to permit circumferential movement of the band 22 so as to “isolate the clamp 23 from having excessive loads applied thereto by movement of the joint 10.” Column 4, lines 38-41. There is no suggestion for the replacement of the rigid tongue and groove configuration with elastically deformable ring segments for connecting the band sections 30 so as to permit the desired circumferential movement of the band 22.

Applicants claimed invention overcomes significant disadvantages inherent in the Baker device. The three separate band sections 30 of Baker substantially complicate the mounting process. In order to mount the Baker clamp 23, all three band sections 30 must be brought into position around the circumference of the bellows sleeve with the respective tongues and grooves intermeshed with one another, and must be held in that position while the clamp 23 is placed in a groove 37 and tightened over the band sections 30 and the sleeve 15. Moreover, the Baker boot assembly has the further disadvantage that, in shifting of the tongue 24 of each band section 30 into the corresponding groove 36 of the next band section requires that the tongue ends of the band sections be lifted away from the sleeve 15 instead of lying flat against sleeve 15.

Though Baker appears to recognize the potential difficulties in mounting, Baker still does not suggest using a plurality of ring sections to form a single piece component, and in no way suggests that such ring sections be elastically deformable. Instead, Baker suggests a different way of overcoming the mounting difficulties: ultrasonically spot welding the band segments 30 to the sleeve 15, to hold them in position for the clamp 23. Column 4, lines 34-37. While the ultrasonic welding step may assist in the pre-positioning of the 3 segments for the clamp during the mounting procedure, it also represents an additional step that would likely increase time and costs of the mounting procedure. The explicit suggestion of the extra mounting step is a further indication that the feature of elastically deformable ring sections joining the compensating pieces to form a single piece component would not have been obvious.

The Examiner asserts, however, that a person of ordinary skill in the art would have

considered it obvious to modify Baker by replacing the band segments 30 with the seal adapter 40 of Devers. According to the Examiner, the motivation is “to provide a more uniform clamping force.” Yet the Examiner points to no evidence of any shortcomings in the uniformity of clamping forces in the Baker device, or that replacing the Baker band segments with the Devers seal adapter would in any way improve the uniformity of clamping forces.

As already noted, Devers teaches disposing a seal adapter 40 between the boot seal 38 and the housing 12, (and not outside of the boot seal 38) for a variety of stated reasons. Yet the Examiner assumes that the person of skill in the art would disregard this central teaching of Devers about the placement of the seal adapter 40, and simply use the seal adapter 40 of Devers on the outside of the bellows as though reversing the relative positions of the bellows and the seal adapter is without technical significance for the sealing device.

The Examiner does not explain why a person of ordinary skill in the art would have any reason to expect a more uniform clamping force in the particular combination of features selected by the Examiner. Nor is there any suggestion in the references that the relative positions of the seal adapter/compensating pieces on the one hand, and the bellows or boot seal on the other hand may simply be reversed without effecting the functionality and quality of the sealing arrangement. In fact, the very position of the Devers seal adapter between the boot seal and the housing is central for achieving the uniformity of sealing and clamping forces “between the seal adaptor assembly and the boot seal *and* between the seal adaptor and the housing.” Column 1, lines 47 to 52. At least one benefit of the uniform compression in Devers is “for holding the resilient seal member (i.e. boot) on the seal adapter assembly” (column 1, lines 63-67) and not vice versa. These and other statements in Devers provide indications that reversing the positioning the Devers seal adapter with respect to the boot is not suggested. Nonetheless the Examiner asserts that the skilled artisan would select only the Devers teaching relating to a single-piece seal adapter 40, while at the same time ignoring the associated teachings relating to the function and positioning of the seal adapter 40 within the Devers device. In fact, changing the relative positioning of the seal adapter 40 not only changes its function, but also would appear to frustrate the entire purpose of Devers and result in an unworkable embodiment.

Furthermore, Baker specifically enumerates the disadvantages of disposing a seal adapter between the bellows and the housing in the manner of the Devers device, see, e.g. column 2, lines 22-35. Thus Baker would suggest to the skilled artisan not to look to the Devers device for

improvement ideas.

Finally, even if the person of skill in the art were to try to use the Devers seal adapter 40 on the outside of the bellows (despite the numerous suggestions against doing so), the combination of the individual features from Devers and Baker as suggested by the Examiner would appear to result in an unworkable seal assembly. Regarding the feature of “elastically deformable” ring sections of claim 1, the Examiner points to language in Devers that suggests a certain level of “pliability” of seal adapter 40: “In the present invention, the seal adaptor assembly 40 can be assembled by a method as set-forth herein by virtue of having enough pliability to be pulled over the end 12a of the housing 12 until the specifically configured inner surface 42 thereof is located to conform to the non-uniform outer surface 36 of the housing 12.” Column 4, lines 10-14.

Applicants submit that this language, which teaches that the Devers seal adapter 40 should have only minimal pliability, further indicates the unsuitability of the Devers seal adapter for combination with the Baker seal assembly. Pliability for “pulling over” the edge of a rigid member (such as Devers housing 12) does not suggest the “elasticity” limitation described and claimed in the present application, but instead demonstrates the incompatibility of the Devers seal adapter 40 for use outside of the bellows. In order to properly function with Baker, the Devers seal adapter 40 would have to have sufficient elasticity to enable the seal adapter: (1) to sufficiently expand to allow room for insertion of the flexible Baker sleeve 15 between the seal adapter and the rigid housing element, and then (2) to contract again to a position firmly pressing on the outside of that surface. No matter what the relative diameters of the seal adapter, housing and bellows, the minimal “pliability” of the seal adapter described in Devers clearly does not suggest this degree of elasticity. Thus, the language with respect to the “pliability” of the Devers seal adapter is not a suggestion for a combination with Baker, but rather a further indication of the unsuitability of the Devers seal adapter for combination with Baker. The combination suggested by the Examiner would have been considered unworkable by a person of ordinary skill in the art.

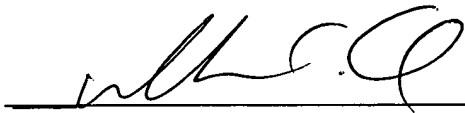
For at least the above reasons, therefore, withdrawal of the rejection to claims 1-3 and 7-12 under 35 U.S.C. § 103 is respectfully requested.

CONCLUSION

For at least the reasons stated above, Applicant requests withdrawal of the rejections. It is respectfully submitted that the application is now in condition for allowance. Should the Examiner feel that an interview would advance prosecution of the present application, the Examiner is invited to contact the undersigned.

Respectfully submitted,

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